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| Grauculus mentalis ... | ... | Varied Grauculus |
| Colluricincla harmonica ... | ... | Harmonious Shrike Thrush |
| Platylea flavipes ... | ... | Yellow-legged Spoonbill [panion) |
| Grus Australasianus ... | ... | Australian Crane (Native Com- |
| Ardea Pacifica ... | ... | Pacific Heron |
| „ Novæ Hollandiæ ... | ... | White-fronted Heron |
| Botaurus poicilopterus ... | ... | Australian Bittern |
| Porphyrio melanotus ... | ... | Black-backed Porphyrio |
| Cygnus atratus ... | ... | Black Swan |
| Anseras melaleuca ... | ... | Semi-palmated Goose |
| Biziura lobata ... | ... | Musk Duck |
| Anus superciliosus ... | ... | Australian Wild Duck |
| Sauloprocta motacilloides ... | ... | Black Fantail |
| Hirundo frontalis ... | ... | Welcome Swallow |
| Geronticus spinicollis ... | ... | Straw-necked Ibis |
| Threskiornis strictipennis ... | ... | White Ibis |
| Hydrochelidon leucopareia ... | ... | Marsh Tern |
| Pomatostomus temporalis ... | ... | Temporal Pomatostomus |
| Plectolophus roseicappilla ... | ... | Rose-breasted Cockatoo |
| Ægialitis nigrifrons ... | ... | Black-fronted Dottrel |
| Grallina picata ... | ... | Pied Grallina |
| Cracticus torquatus ... | ... | Collared Crow Shrike |
| Sarciophorous pectoralis ... | ... | Black-breasted Plover |
| Lobivanellus lobatus ... | ... | Spur-winged Plover |
| Podiceps gularis ... | ... | Black-throated Grebe |
| Tribonyx ventralis ... | ... | Black-tailed Tribonyx |
| Phalacrocorax melanoleucus | | Little Cormorant |
| „ strictocephalus | | Little Black Cormorant |
| Psephotus hæmatonotus ... | ... | Red-rumped Parrakeet |
| Platyercus zonarius ... | ... | Banded Parrakeet |
| Entomyza cyanotis ... | ... | Blue-faced Entomyza |
| Corcorax melanorhamphus ... | ... | White-winged Chough |
| Xerophila leucopsis ... | ... | White-faced Xerophila |
| Zosterops cœrulescens ... | ... | Grey-backed Zosterops |
| Myzantha garrula ... | ... | Garrulous Honeyeater |
| Epthianura albifrons ... | ... | White-fronted Epthianura |

NOTES ON THE ROCKS OF BRIGHTON AND MOOR- ABBIN AND THE SURROUNDING DISTRICTS.

BY T. S. HART, M.A.

(*Read before the Members of the Field Naturalists' Club on 16th
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THE subject of these notes is the Upper Tertiary deposits which occur in Brighton and Moorabbin and the surrounding districts.

The order of succession of the various strata is best seen on the coast at Beaumaris, where the following appear in order from the bottom upward:—1st, ferruginous and calcareous sandstones.

and shelly marls, with an abundance of fossils; 2nd, a series of ferruginous sandstones, with ironstone bands, and no fossils; 3rd, a deposit of sand coarser, and usually less firmly cemented, than the lower rocks—grey, white, yellow, and red in colour—which I have, in what follows, referred to as the lower sand; 4th, a second deposit of loose white sand, referred to in what follows as the upper sand, with a layer of recent shells at the top, principally mussels. These do not appear directly over each other at one place, but by a fold in the rocks are shown in succession. Following the coast from Rickard's Point to Mentone, the upper sand is almost or quite continuous, and unaffected by the fold, but in the others the following changes occur:—At first we see the ferruginous sandstones, the second series above mentioned, overlaid by the lower sand. Going towards Beaumaris the strata rise gradually, the lower sand becomes thinner and soon appears only in patches; the greater part of the cliffs is formed of the ferruginous sandstones below it, and the fossiliferous rocks below it appear at the surface. Then the rocks are sharply bent over, dipping S. 20° E., at about 30° at the steepest part, being much cracked and slightly faulted. The lower sand re-appears, dipping with the underlying rocks, which with part of them sink below the beach. The strata then soon resume a horizontal position, and then dip at a low angle in the opposite direction. At the end of Charman's-road the upper sand can be seen resting on the denuded edges of the strata of the lower sand. The fossiliferous beds at the bottom of the series appear nowhere else at the surface in this district, but have been passed through in bores at Mordialloc, at a depth of about 130 feet, and appear to be about 45 feet in thickness.

The second series, consisting of ferruginous sandstones with a thickness of about 70 feet, appears at intervals along the coast, forming the base of nearly all the points, which seem to be due to their greater resistance to the action of the sea. At the end of Park-street, Brighton, they contain a few fossils similar to those found at the Royal Park; and a few casts of small shells also appear at the Red Bluff, Sandringham, and to the north of Black Rock. At the Red Bluff I also obtained from this bed a portion of a tree, about 5 feet long, 4 inches thick vertically, and 9 inches wide. From the nature of the wood it appears to be a conifer.

The surface of these ferruginous sandstones is more or less eroded, and on it rests the next series—the lower sand. This is the most extensively developed deposit throughout the district. Between Beaumaris and Mentone these rocks form cliffs about 60 feet high, and allowing for the part which is seen to disappear below, at the fold at the end of Charman's-road must have a thickness of over 100 feet. The lower parts are of

a grey colour, sometimes nearly black, and contain frequently traces of carbonaceous matter, which at Mentone form thin seams ; with these are patches of a pale yellow mineral, probably basic sulphate of iron. Near Mentone these lower beds at one place pass into a ferruginous sandstone. At various places on the coast between Beaumaris and Sandringham a similar rock occurs to a small extent, and at Red Bluff again we have distinct patches of carbonaceous matter. These pass gradually at Mentone into a friable sand rock, formed of coarse quartz sand and more or less iron oxide, and varying in colour from white to yellow and red. Similar rocks occur throughout the district, and form the main part of the lower sand ; but only at Mentone does the complete series appear without a break. In other places there is a break between this and the underlying portion of this series, or the lower portions are entirely absent. The lower portions of the sand frequently are finer and more compact, with ironstone bands, and at Windsor and St. Kilda beach contain thin beds of ferruginous sandstone, resting on the Silurian rocks. The greater part of this deposit consists of coarse sand, with a few rounded quartz pebbles, and varies greatly in colour and consistency. Its colour is white, yellow, or any shade of brown or red, according to the quantity of iron oxides present. Sometimes it is very friable, sometimes hard and compact ; and this hardening may take place along certain beds or in irregular bands and patches. The present surface is very irregular and usually covered by gravel, which seems to have been formed by the removal of the finer and softer parts of the rock. The gravel varies in amount and nature according to the variations in the underlying rocks. At some places, as in the cutting south-east of Elsternwick station, a large mass of sandstone is left on the top of the sand, projecting into the newer deposits, being a hard portion of a higher bed which has resisted breaking up and has been too heavy to remove. The sand sometimes contains a large amount of clay, and at one place, between Brighton Beach and Picnic Point, it is very calcareous ; but this calcareous rock passes gradually into the ordinary sands. The lime percolating through has here filled all the cracks in the underlying rocks forming vertical and horizontal sheets and irregular patches of impure crystalline limestone among them.

After the erosion of these deposits to near their present form there followed another series of deposits, the upper sand, referred to before, associated with which are two shell beds. The lower of these, which I have seen only at Picnic Point, contains all recent species, though some are not found or are rare there now. It, at first sight, appears to run into the lower sand ; but further examination shows that this is not the case. It is a few feet above the present water level at its highest part, and descends to

a little below. Over it is the upper sand, which here also contains a few shells of recent species, and consists of a loose white sand. This deposit—but without the shells—continues along the coast and inland, and in some places seems to have been deposited on land. Part of the alluvial deposits on the Carrum swamp and other low-lying places are probably contemporaneous with this. Above this a line of recent shells of a few species occurs, which continues all along the coast, with few interruptions, from Point Ormond to Mordialloc.

The deposits in progress consist chiefly of alluvial on the swamps and blown sand hills at low parts of the coast. During the progress of these deposits various movements must have taken place. The ferruginous sandstones, or the second series, were uplifted and denuded to some extent, after which the deposit of the carbonaceous beds of the lower sand commenced, south of Picnic Point, probably in swamps or salt lagoons. A slight elevation interrupted this deposit north of Beaumaris, but in the southern part it continued. On subsidence again taking place the main portion of the lower sand was deposited over a large area, extending as far as the ranges beyond the Koo-Wee-Rup. Elevation followed and this deposit was eroded, the gravels being probably formed by marine action during the movement. The lower sand on Picnic Point was then formed and the upper sand of the district; after which the land was again submerged to a depth of about 60 ft. at least when the raised beach along the top of the cliffs was formed. The gravel at Point Ormond may also have been formed at the same time. From that time there appears to have been a gradual elevation. Many of these movements may have been only local, and it is certain that the elevations were not equal, or nearly so, at different parts of this district. Thus the fold at Beaumaris shows a difference of elevation, in a very short distance, of nearly 100 ft.; and the lower shell bed at Picnic Point shows that more recent movements were also unequal. In particular, the last subsidence appears to have been local; so that, though contemporary marine deposits may occur up to some hundreds of feet, it does not follow that this district has been raised to that extent as well. But though no volcanic rocks appear in this district, there was great volcanic activity near at hand, for two series of volcanic rocks are found in the Yarra Valley of more recent date than the lower sand; and these irregular movements are only another evidence of the unstable state of the country at that time.

EXCHANGE.—To Entomologists.—Mr. W. B. Waterfall, Thirlmere, Redland Green, Bristol, England, desires to exchange English Coleoptera for Australian, and will be pleased to open up correspondence with collectors.